DESCRIPTION OF A NEW VARIETY OF HALIOTIS FROM CALIFORNIA, WITH FAUNAL AND GEOGRAPHICAL NOTES.

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Of the littoral fauna of that long line of coast extending from Point Bonita, on the north side of the entrance to San Francisco Bay, to Cape Flattery, the southerly point of the entrance to the Strait of Juan de Fuca, a stretch of nearly 700 nautical miles, but little is known. The general aspect of the coast throughout most of its extent is broken, jagged, and rocky, with bold abrupt bluffs, against which in ordinary weather the ocean dashes with greater or less violence, and therefore unfavorable to the field work of the naturalist.

There are, however, many reaches of a more inviting character, where the rocky shore dips under the sea with so moderate a slope that the zone uncovered at extreme low tides is of considerable width, often seamed and cut up by narrow furrows and channels, with many shallow pools, and frequently clothed with a heavy growth of bladder weed, altogether presenting a tempting challenge to the collector.

Then there are sandy flats of considerable area, as at Tomales and Bodega, and gravelly beaches occur, of moderate extent, with occasional, sometimes numerous, detached rock masses and bowlders.

While there are many so-called ports, embarcaderos, or landing places between the points above named, especially along the California coast, a large proportion, perhaps one-half or more of the coastwise settlements indicated on the map, consist of small communities incidental to the limited local business. At these places it is often the case there is no harbor, merely a simple roadstead or anchorage, available only in good weather. For the purposes of the collector the immediate neighborhood of many of these places is of trifling importance. The desirable portions of the coast are generally inaccessible by sea and require an outfit for land service, with camp equipage and the usual requisites, with ample appliances for shore work. The best time of the year is the spring, the months of March, April, and May, before the harsh westerly winds begin to sweep in from the sea—usually from the first to the middle of June.

Bolinas, Tomales, and Bodega bays, particularly the first and the adjacent Duxbury reef, being near San Francisco, have been visited by a few collectors, by Colonel Jewett and myself in 1866, and since by Raymond, Hemphill, and Wood, and again by the author, but nothing like thorough work has been done even at these places, the number of species of mollusks usually obtained being from 90 to 100. At Bodega, visited by Dr. Newcomb and myself in 1867, some 90 species were collected. Mr. Hemphill has collected at Fort Bragg and Humboldt Bay, at the latter place securing some interesting forms, including *Paludinella newcombiana*, a new species. On the coast of Mendocino County, nearly thirty years ago, Mr. Harford found near Big Spanish Flat a new *Fusus* (*F. harfordii*). His collection was exceedingly meager, most of his time having been devoted to botany. A visit to Crescent City made by the author in 1862 was a failure so far as shell collecting was concerned, for the beaches and shores in every direction were so piled up with driftwood and the refuse of the great flood of the previous winter as to be absolutely inaccessible. Some little collecting has been done at Coos and Shoalwater[1] bays and at Grays Harbor, on the coast of Washington.

It will be seen from the foregoing that the totality of research throughout this great stretch of coast is quite insignificant. The same may be said in great measure of the biological investigation of the uplands back from and bordering on the shore.

The occurrence of *Olivella intorta* in quantity somewhere along the coast in the neighborhood of Trinidad is implied by the large number of this rare species contained in a necklace[2] obtained from the Hoopa Indians by Lieutenant Ray.

Another peculiar form has recently been added to the few that have been detected in the region herein reviewed.

HALIOTIS FULGENS Philippi var. WALALLENSIS Stearns.

On the coast of Mendocino County, California, in the extreme southwest corner, close to the northerly boundary line of Sonoma County, is an embarcadero, or shipping point of the lumber interests of that neighborhood. Here is situated a small settlement known as Gualala.[3] The coast hereabout is broken and rocky, with bluffs 50 to 100 feet high. In the immediate vicinity of this village Mr. J. J. Rivers some years ago collected the form here described,[4] specimens of which are contained

[1] It may be well to recall what I have elsewhere mentioned, the planting of *Mya arenaria* in Shoalwater Bay by Captain Simpson, of San Francisco. This was some fifteen years ago.

[2] Cat. No. 77185, U.S.N.M., Ethnological department.

[3] Gualala, which is the official post-office name of the village, is a localized corruption of the Indian *Walalla*, which latter, I think, should be perpetuated.

[4] A preliminary description of this variety was published in The Nautilus, No. 9, XII, January, 1899.

in the U. S. National Museum (Cat. No. 98327) and in the museum of the University of California.

The examples in the U. S. National Museum collection were presented to me by Mr. Rivers, and are a part of the original lot. The largest adult is of much smaller size than average full-grown examples of the ordinary form of *H. fulgens*. My examination of the entire series collected by Mr. Rivers suggested the European *H. tuberculata* of the Channel Islands. There is a Japanese species figured in Reeves's Conchologia Iconica, *H. planata* Sowerby, which it somewhat resembles. As my notes were unfortunately destroyed some years ago, Mr. Dall has kindly furnished the following from the U. S. National Museum examples:

Shell of an oval form, considerably flattened, and with about two and a half whorls; color, dark brick red, with occasional mottlings of pale bluish green; holes, four in the young to six in the adult; sculpture of fine, somewhat irregular spiral threads, crossed by fine, close, slightly elevated, sharp concentric lamellæ, and a few small obscure wavelets which radiate obliquely from the apex; nacre rather pale, with pink and pale-green reflections, but much less deep in color than the typical *fulgens*.

This variety differs from the type in its more elongate and flattened form, its constantly finer, spiral threading, and its paler nacre. The concentric lamellation is sometimes undeveloped on the young shells. It has the same number of holes as the type.

The above may be regarded as the extreme northerly expression of *H. fulgens*, which has not heretofore been credited to any part of the coast north of Point Concepcion. From that point to Gualalla is an immense jump, about 320 nautical miles.

Regarding the number of holes in certain species of *Haliotis*, I find the following in my notes: *H. fulgens*, from Lower California, fifty-six show a total of 326 complete and incomplete, an average of six and a fraction; one example had 8 and five 7 holes. Of *H. rufescens* twenty-four had 87 complete, fifteen showing 60, and nine 27 holes, an average of $3\frac{5}{8}$. *H. cracherodii*, thirty-seven examples gave a total of 236 complete holes, an average of about $6\frac{1}{2}$; one individual had only 2, two had 4, while five had 9, approaching the insular form known as *Californiensis* Swainson. All of the foregoing were adult shells.

The "Abalone fishery" on the west coast has been pursued unceasingly for about thirty-five years. My notebook shows that as long ago as the year 1866 no less than 1,697 sacks, each containing from a bushel to a bushel and a half, were exported to China. At that time, and for many years after, the "dried meats" only were of commercial value, there being but a very limited demand for the shells. Later the shells came into general use for a great variety of purposes, so the fishery has been followed more energetically than ever, with the result that in many places the supply has been nearly exhausted. In certain localities where the principal species, *Haliotis rufescens*, *H. cracherodii*, and *H. fulgens*, were abundant they are now comparatively scarce. Recently

the attention of the authorities of some of the seaboard counties having been called to the matter, it is likely that before long the fishery will be either prohibited for a term of years or in some way regulated by law. From the little island of Anacapa in the Santa Barbara channel two persons obtained over 2 tons of shells and meats, being their second catch within a few months. Fortunately there are numerous places along the coast that are inaccessible, so there is but little danger of any of the species becoming absolutely extinct.